Surname	Centre Number	Candidate Number
Other Names		2

GCE A LEVEL

1420U50-1E

S18-1420U50-1E

PHYSICS – A2 unit 5
Practical Examination

Practical Analysis Task

FRIDAY, 27 APRIL 2018 – MORNING

1 hour

For Examiner's use only		
Question	**Maximum Mark**	**Mark Awarded**
1.	**4**	
2.	**21**	
Total	**25**	

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ADDITIONAL MATERIALS

In addition to this examination paper, you will require a calculator and a **Data Booklet**.

INSTRUCTIONS TO CANDIDATES

Use black ink or black ball-point pen. Pencil may be used to draw tables and graphs.
Answer **all** questions.
Write your name, centre number and candidate number in the spaces at the top of the page.
Write your answers in the spaces provided in this booklet.

INFORMATION FOR CANDIDATES

The total number of marks available for this task is 25.
The number of marks is given in brackets at the end of each question or part-question.
You are reminded of the necessity for good English and orderly presentation in your answers.

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Answer **all** *questions.*

1. *(a)* Elin drops a ball from a height of 1.20 m and 0.80 m and measures the rebound height using a metre ruler of resolution ± 0.01 m. She obtains the following results.

Drop height (m)	Rebound height (m)
1.20	0.75
0.80	0.35

Elin predicted that the rebound height would be directly proportional to the drop height. Without drawing a graph explain whether Elin's results support her prediction. [3]

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(b) Describe one way in which Elin could improve the experiment to obtain more **accurate** results. [1]

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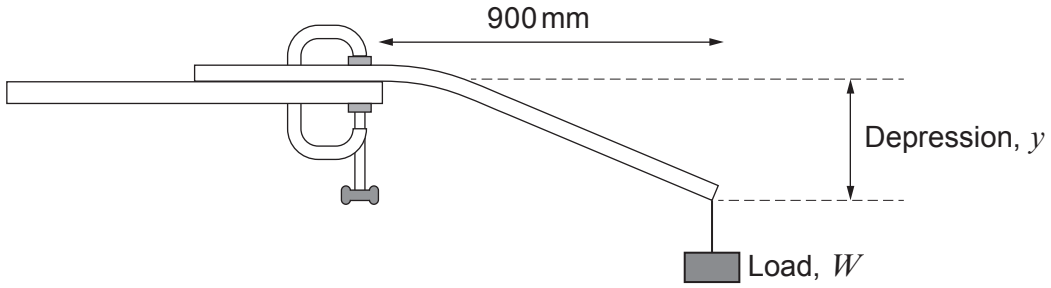
2. An investigation is carried out into the variation of the depression, y, of a cantilever (metre ruler) with load. The following apparatus is used.



The depression of the cantilever was measured on loading and then unloading using a metre ruler of resolution ± 0.1 cm. The results were recorded in the table below.

Load, W / N ± 5 %	Uncertainty load / N	Depression loading / cm	Depression unloading / cm	Mean depression, y / cm	Uncertainty depression / cm
2.0		8.1	8.3		
3.0		11.4	11.4		
4.0		14.5	14.6		
5.0		17.5	17.3		
6.0		20.7	21.0		

(a) **Complete the table** above. [3]

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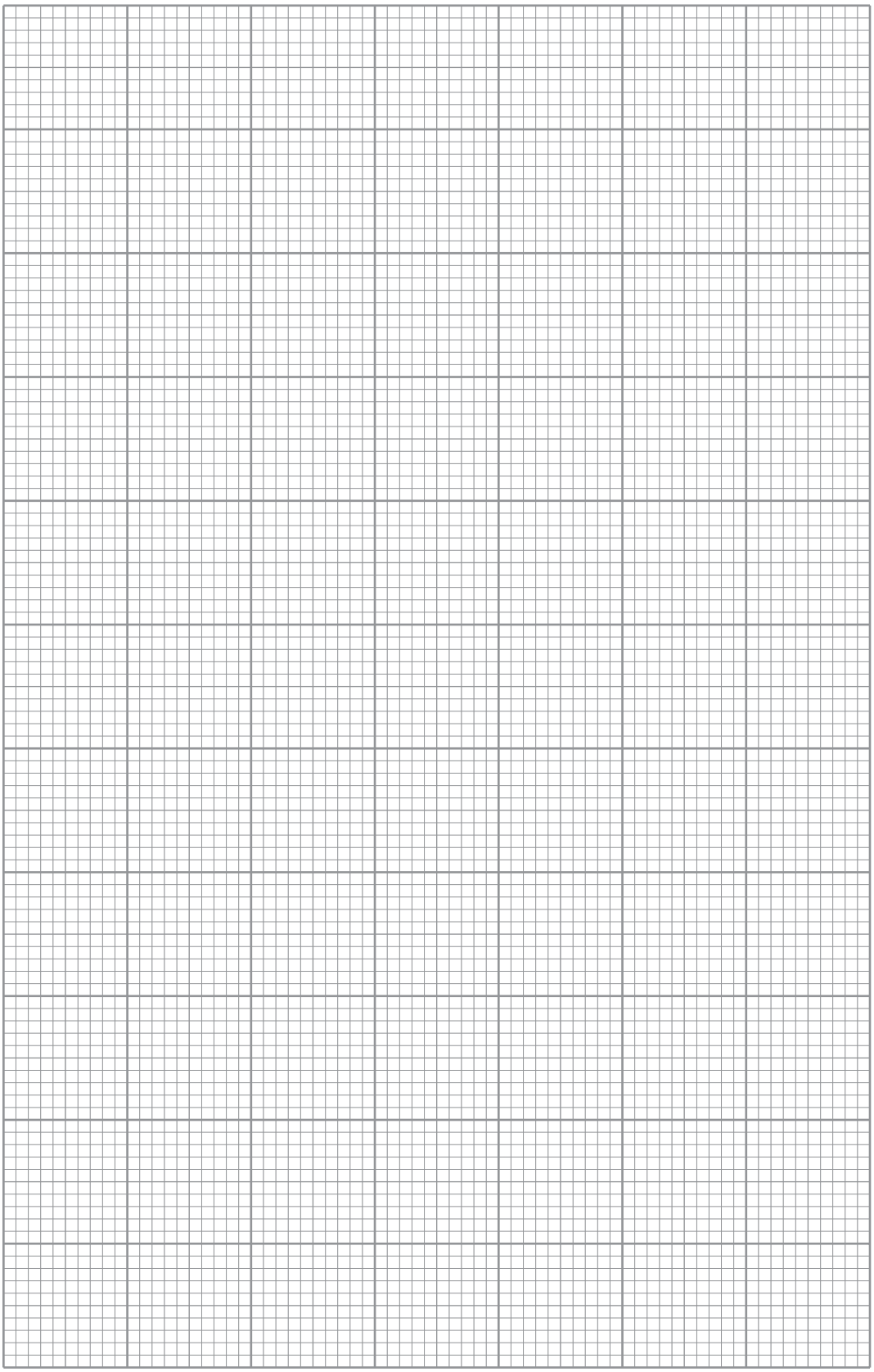
(b) Plot a graph of mean depression, y, (on the vertical axis) against load, W, (on the horizontal axis). Include error bars on both axes **where possible**, and draw a line of maximum gradient and a line of minimum gradient. [5]



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(c) (i) Calculate the maximum and minimum gradients for your graph. [3]

(ii) Hence, determine the mean gradient and its **percentage** uncertainty. [2]

(d) (i) Theory states that the mean depression, y, is related to the load, W, by the equation:

$$y = \frac{4Wl^3}{Ebd^3}$$

where: l is the length of the ruler = 900 ± 1 mm
b is the breadth of the ruler = 23 ± 1 mm
d is the thickness of the ruler = 6.5 ± 0.5 mm
E is the Young modulus of the ruler

Determine a value for the Young modulus, E, along with its **absolute uncertainty**. [5]

Turn over.

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(ii) State which quantity contributes the largest uncertainty and describe how this could be reduced. [2]

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(iii) Suggest a reason why you would **not** expect your graph to pass through the origin. [1]

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END OF PAPER

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